The Marie Curie Alumni A...

# Influence Diagrams are a solution to operator overload!

Marie Curie Alumni Association (MCAA) Follow 2 min read · Jul 6, 2023

by Joseph Mietkiewicz

The following Blog has been developed by one of the participant of the recent MCAA ECS Satellite event on Science Communication.
During the workshop, participants were invited to work on a scientific blog and submit their final piece to be published on the MCAA Blog.

The piece has been revised by a **task-force of the MCAA Communication Working Group**. Members of the team included: Maria Montefinese, Luisa Merz, Ashish Avasthi, Pradeep Eranti, Nicoleta Spînu, and Ruben Riosa.

Enjoy the piece!

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One may have heard the words “control room” but did you know that there is a control room in chemical industries as well? The role of this special chamber is to monitor the chemical processes in the industry. Since they must keep the process running and tackle any deviance from the process (which at times can lead to hundreds of alarms going off simultaneously), it can be quite challenging. Such instances can put the operator in a difficult position.

In such situations, the person in charge is more likely to use a cognitive bias to make a decision rather than carefully weighing the pros and cons of the decision. For instance, the person is more likely to focus on the last alarm that occurred or the alarms they are more familiar with.

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In order to avoid this context/bias, a decision support system is needed. This is where an influence diagram can be helpful.

An influence diagram is a powerful probabilistic graphical model. It can provide interpretable and optimal decisions in terms of cost and risk. It can be built using expert knowledge and data to model the process. It is an ideal candidate to build a trustworthy recommendation system in the industry.

Moreover, using a dynamic influence diagram allows us to monitor the process over time. It can predict future states of the process and build optimal scenarios. The dynamic influence diagrams that I built for my research can be seen in Figure 1.

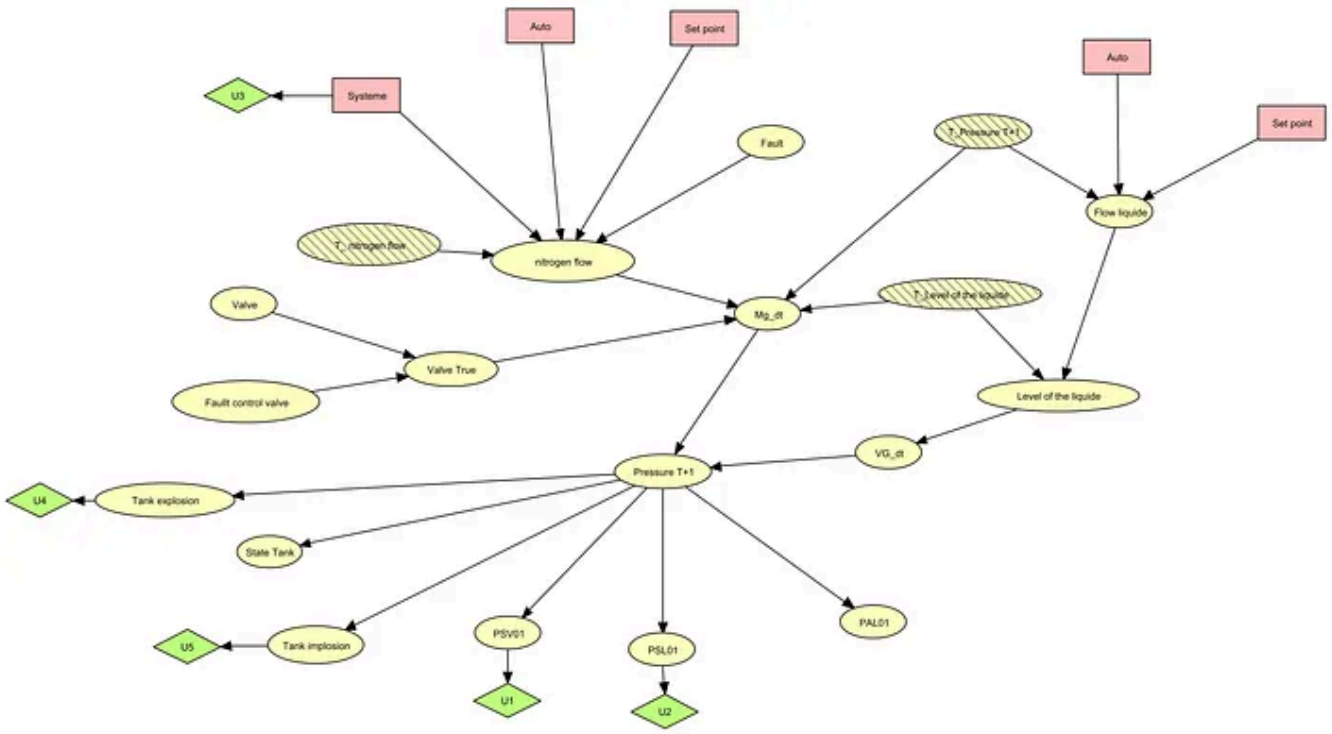


Figure 1: Dynamic influence diagram of the tank system of formaldehyde production. The yellow nodes represent variables like temperature and pressure or possible default in the process. The stripe represents the node in the past. The pink ones are decisions like the set point of a flow that an operator can change. The green ones are costs associated with bad events like critical alarms.

Although the caveat is that even if the model provides the optimal recommendation, the conundrum still exists that the operator will trust it or will just follow the recommendations blindly. Therefore, a study of the impact of such a recommendation system is very important to assess its influence on operator performance. Moreover, the recommendation system adds information to the process in an environment already full of information. This is part of my research where I explore the impact of recommendation systems using AI in control rooms.

Stayed tuned for the result.

*Project website: https://www.ciscproject.eu/*


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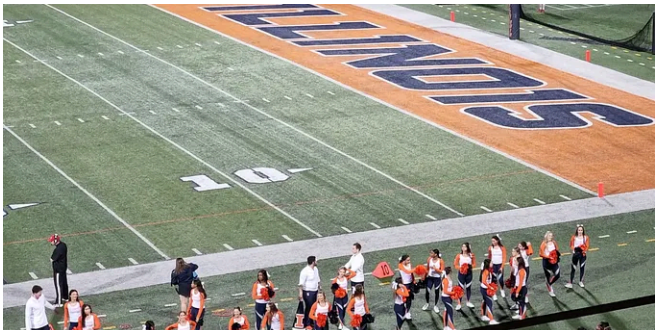


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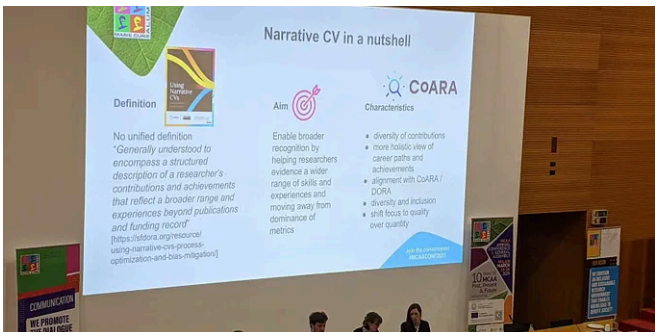
Narrative CV in a nutshell
Definition
No unified definition
"Generally understood to encompass a structured description of a researcher's contributions and achievements that reflect a broader range and experiences beyond publications and funding record"
Aim
Enable broader recognition by helping researchers evidence a wider range of skills and experiences and moving away from dominance of metrics
CoARA
Characteristics
diversity of contributions
more holistic view of career paths and achievements
alignment with CoARA / DORA
diversity and inclusion
shift focus to quality over quantity
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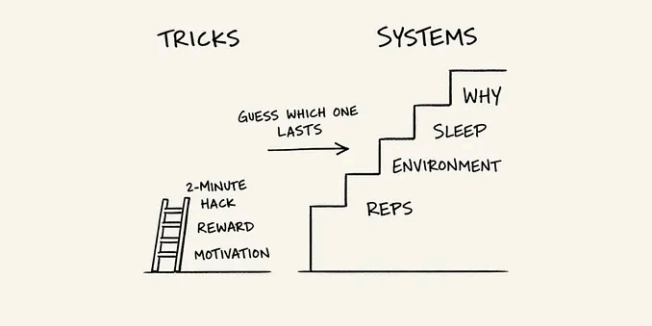


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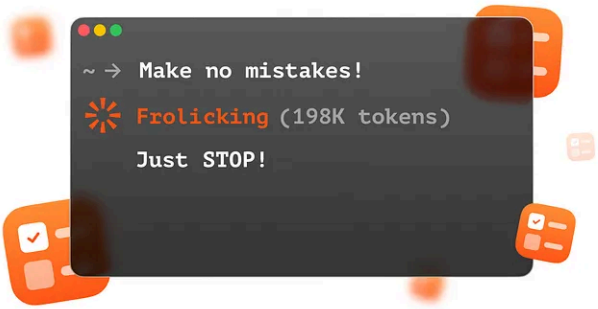


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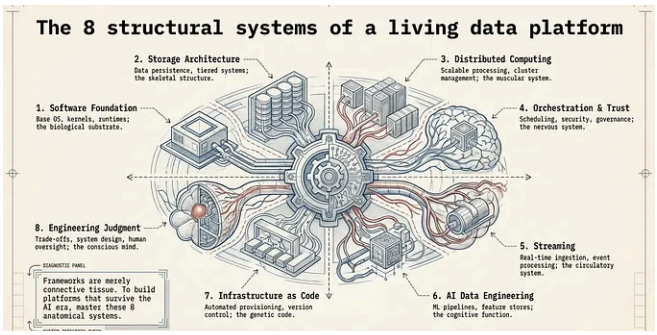
The 8 structural systems of a living data platform
1. Software Foundation
Base OS, kernels, runtimes; the biological substrate.
2. Storage Architecture
Data persistence, tiered systems; the skeletal structure.
3. Distributed Computing
Scalable processing, cluster management; the muscular system.
4. Orchestration & Trust
Scheduling, security, governance; the nervous system.
5. Streaming
Real-time ingestion, event processing; the circulatory system.
6. AI Data Engineering
ML pipelines, feature stores; the cognitive function.
7. Infrastructure as Code
Automated provisioning, version control; the genetic code.
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